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APPLICATION FOR UNITED STATES LETTERS PATENT

INVENTOR: JENS B. JUNKERMANN

TITLE: XML-BASED MULTI-FORMAT  
BUSINESS SERVICES DESIGN  
PATTERN

ATTORNEY: Sanders N. Hillis  
BRINKS HOFER GILSON & LIONE  
One Indiana Square  
Suite 2425  
INDIANAPOLIS, INDIANA  
46204-2013  
(317) 636-0886

## XML-BASED MULTI-FORMAT BUSINESS SERVICES DESIGN PATTERN

This application claims the benefit under 35 U.S.C. §119(e) of Provisional  
U.S. patent application Serial No. 60/268,981, filed on February 15, 2001.

### COPYRIGHT NOTICE REFERENCE

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### COMPACT DISC/COPYRIGHT REFERENCE.

A computer program listing appendix is file herewith and herein incorporated-by-reference in its entirety. The computer program listing appendix includes a first compact disc (copy 1) containing a computer program listing consisting of 10 files. In addition, the computer program listing appendix includes a second compact disc (copy 2) which is an exact duplicate of the first compact disc.

### FIELD OF THE INVENTION

This invention relates to application software architectures, and in particular, to architectures operating with multiple presentation formats in a diverse front-end systems layer and a diverse back-end systems layer.

### BACKGROUND OF THE INVENTION

Many financial services related businesses, such as banking, brokerage and insurance companies, are looking for ways to provide their core services to customers across electronic delivery technologies. These businesses are developing software applications and architectures to allow customers to tap into the business's existing application software infrastructure and access information contained in existing databases. Creating the software applications and architectures typically includes

development of presentation and interfacing logic. In general the presentation and interfacing logic allows access to the information by customers using different front-end delivery technology, such as Internet browsers, interactive voice response units (IVRs) and wireless application protocol (WAP) phones.

5 In most cases, the presentation and interfacing logic is developed redundantly for every delivery technology. As such, changes to the underlying services may result in additional software development for each delivery technology. Moreover, because the information is usually handled with static data structures, any additional information required by customers may lead to a change in all software components related to this functionality.

10 One possible solution to this problem involves the use of extensible markup language (XML) technology. The XML technology is easily configurable and provides an extensible data structure. In addition, XML may be configured to provide a mechanism for translating the data for the different delivery technologies. However, the complexity and broad applicability of XML, along with multiple differing implementations available make a solution directly utilizing XML technology difficult to implement and maintain.

#### BRIEF SUMMARY OF THE INVENTION

15 In view of the above, XML technology is leveraged through a set of classes that provide an easier to use abstraction for an application programmer than direct application of XML would provide. The set of classes are included within a business services layer. The business services layer provides a foundation for an XML based e-commerce software architecture that includes an end-user systems layer, a front-end systems layer, the business services layer and a back-end systems layer. The design pattern provided by the business services layer allows different delivery technologies within the end-user systems layer to interface with data contained within the back-end systems layer via the front-end systems layer. Messages in the form of requests for data and messages containing corresponding data are transferred between the front-end systems layer and the back-end systems layer using functionality within the business services layer. The functionality of the business services layer operates

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